WHAT IS CLAIMED IS:

1. An electronic device, comprising:

an active region located over a substrate;

an undoped layer located over the active region; and

a doped upper cladding layer located over the undoped layer, wherein a diffusion barrier region including aluminum is located between the undoped layer and the doped upper cladding layer.

2. The electronic device as recited in Claim 1 wherein the diffusion barrier region is a diffusion barrier layer or a number of diffusion barrier layers located between a plurality of the undoped layers.

3. The electronic device as recited in Claim 2 wherein the number of diffusion barrier layers ranges from about 1 to about 8 layers and each of the number of diffusion barrier layers has a thickness of about 1 nm.

4. The electronic device as recited in Claim 1 wherein the diffusion barrier region includes an diffusion barrier layer consisting of aluminum arsenide, aluminum phosphide, indium aluminum arsenide, indium aluminum arsenide phosphide, or indium aluminum gallium arsenide.

5. The electronic device as recited in Claim 4 wherein the diffusion barrier layer comprises between about 5 and about 50 percent aluminum.

6. The electronic device as recited in Claim 1 wherein the diffusion barrier region has a thickness of about 1 nm and the undoped layer has a thickness of about 10 nm.

7. The electronic device as recited in Claim 1 wherein the diffusion barrier region does not form a p-n junction with the doped upper cladding layer.

8. The electronic device as recited in Claim 1 wherein the doped upper cladding layer is doped with zinc and the diffusion barrier region inhibits the diffusion of zinc into the active region.

9. A method of manufacturing an electronic device, including:

forming an active region over a substrate;

forming an undoped layer over the active region; and

forming a doped upper cladding layer over the undoped layer, wherein a diffusion barrier region including aluminum is formed between the undoped layer and the doped upper cladding layer.

10. The method as recited in Claim 9 wherein the diffusion barrier region is a diffusion barrier layer or a number of diffusion barrier layers located between a plurality of the undoped layers.

11. The method as recited in Claim 10 wherein the number of diffusion barrier layers ranges from about 1 to about 8 layers and each of the number of diffusion barrier layers has a thickness of about 1 nm.

12. The method as recited in Claim 9 wherein the diffusion barrier region includes an aluminum diffusion barrier layer consisting of aluminum arsenide, aluminum phosphide, indium aluminum arsenide, indium aluminum arsenide phosphide, or indium aluminum gallium arsenide.

13. The method as recited in Claim 12 wherein the diffusion barrier layer comprises between about 5 and about 50 percent aluminum.

14. The method as recited in Claim 9 wherein the diffusion barrier region has a thickness of about 1 nm and the undoped layer has a thickness of about 10 nm.

15. The method as recited in Claim 9 wherein the diffusion barrier region does not form a p-n junction with the doped upper cladding layer.

16. The method as recited in Claim 9 wherein forming a doped upper cladding layer includes forming a zinc doped upper cladding layer, wherein the diffusion barrier region inhibits the diffusion of zinc from the upper cladding layer into the active region.

17. An optical fiber communications system, comprising:

an optical fiber;

a transmitter and a receiver connected by the optical fiber; and

an electronic device, including:

an active region located over a substrate;

an undoped layer located over the active region; and

a doped upper cladding layer located over the undoped layer, wherein a diffusion barrier region including aluminum is located between the undoped layer and the doped upper cladding layer.

18. The optical fiber communication system recited in Claim 17 wherein the diffusion barrier region is a diffusion barrier layer or a number of diffusion barrier layers located between a plurality of the undoped layers.

19. The optical fiber communication system recited in Claim 17 wherein the transmitter or the receiver includes the electronic device.

20. The optical fiber communication system recited in Claim 17 further including a source or a repeater.